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Steel belts in Treibwerken for plants, e.g. Plants to the promotion of loads

The invention relates to of rollers propelled and diverted resilient bendable steel belts in Treibwerken, e.g. Lifting gear in plants to the promotion of loads.

With Treibwerken of this type the prepared course of the steel belts difficulties, there it on deviations of the rollers and the load guidance of the exact Planlage, those in the assembly and/or by later changes (e.g. Setting) caused to be can do, very delicate responsive and consequently the safety of the steel belts already with smaller and unavoidable deviations affected are.

The invention is the basis the object to supervise and ensure by a row sicherheitlich associated constructional measures and provisions those according to plan each other safety of the steel belts altogether and in particular the squeezing free course of the steel belts also with unscheduled layer of the rollers adjusting to guarantee.

This object is after the invention dissolved by the fact that the roller consists the basis role of a basis role with concave Umfläche and a comprising adjusting ring with convex inner surface, whose diameter is larger around the one diameter difference in the centre plane of the roller as the diameters of the basis role in the same Mittelebene the roller, and furthermore the half is larger measurer of the concave Umfläche of the basis role as the radii of the convex inner surface of the adjusting ring, so that into the Falle of a mismatch the run-planar of the steel belt and the basis role the adjusting ring moves into the run-planar of the steel belt and thus the squeeze-free course of the steel belt ensured remains. The assembly of the Treibwerke to each other necessarily certain must regarding displacement and wind-oblique axes of the castors Tolerances to be granted. By the erfindungsgemäße roller an additional stress of the steel belts is by of conference off yielding in the predetermined tolerance range and eventual later setting excluded.

With a Ausführungsform of the invention the basis role is provided to the receptacle of the adjusting ring transverse to its axis divided and the adjusting ring with a convex Umfläche, which is coated with bind-careful bedding material of high and constant heating value. The Umfläche of the basis role and the inner surface of the adjusting ring e.g. are against rolling wear.

by surface-hardening in actual known manner protected.

The basis role and/or the adjusting ring are provided with flanges and/or approach disks. The convex Umfläche of the adjusting ring effected in the squeeze-free run-planar of the

steel belts, which agrees with the run-planar of the adjusting ring, a centring of the center of the steel belt on the elements of the Umlfläche of the adjusting ring, which shifts itself with its inner surface on the Umlfläche the basis basis.

With an other embodiment of the invention are in case of the roller driven are provided, the Umlfläche of the basis role and the inner surface of the adjusting ring with an elbow teeth with tape skew play. . Arrangement of several steel belts these become either on being placing a ring with several running surfaces or on getrennteh adjusting rings of undjoder rollers diverted. The running surfaces have a larger width than the steel belts and before the flanges preferably are loosely running along approach disks with bind-carefully coated, resilient back-yielding and inclined/slanted approach-flat arranged and with small diameter on the inches of the rollers stored. The driving moment exerted on die3asisrolle becomes by actual known positive teeth with limited adjustment possibilities on the adjusting ring and thus on the steel belt transmitted. For the zwängungsfreien run of the steel belts it is sufficient generally, if the loosely running along castors can adjust themselves to the run-planar belt. The aforementioned characteristics according to invention in cooperation with the convex and broader Umlfläche of the adjusting ring prevent throughout the start of the steel belts to the approach disks; these are designed however on a indulgence of the edges of the steel belts for safety's sake, also by the smaller resistance to rolling of the small camp diameter.

With another embodiment of the invention the Umlflächen of the adjusting rings is only slight spherically convex formed and the crowning is kreishogenförmig or exhibits in the edge regions stronger curvatures than in the central portion and with several steel belts on the Umlfläche is for each steel belt a spherical region of the bearing surface provided or is only the two rimming steel volumes spherical Umlflächen associated. The small crowning of the Umlfläche avoids high additional along and wuerspannungen in the steel belts. Smaller compressive stresses in the tape edges are favourable with the deflection fbr the fatigue strength of the steel belts. With application of the Merkmale according to invention it can be favorable, if the course of the middle belts becomes secured by the centered rimming steel volumes.

According to invention several approach switches are preferably arranged on the flanges of the castors and the flanges of the adjusting rings at the periphery in or. These are in the regular operative condition with their contact arm in actual known manner resilient on the front surfaces of the flanges pressed and e.g. cause with the start of the steel belt to the switching arm between contact arm and or several in actual known manner.

by rollers in small and constant distance of the flange switch contacts held at the Umfang of the flanges an optical and/or acoustic display and/or the putting out of operation of the Treibwerkes immediately or after completion of the operating period. The start can not only by unscheduled goes wrong the steel belt, but also by the sword due to a larger Incipient crack in the steel belt caused its. There by the characteristics of the invention however emigrating the steel belts beyond the larger width of the running surfaces, i.e. a start of the flanges only then to occur can, if unscheduled b yielding or changes in a

larger than intended extents arise, is after responding the approach switch iJl everyone; Cases at least an examination of the Treibwerkes required.

With an embodiment of the invention the end of the tape is in actual known manner in a thimble fixed and hurries the thimble is lzngsgeteilt. Between the parts of the wedge a gap and the parts of the wedge remain are around a placing ball add the two part of the wedge to each other more pivotable, so there the two parts of the wedge when putting in around the two-piece hurry put end of the steel belt into the thimble squeeze-free over the end of the steel belt to the supporting surfaces of the thimble to put on and edge pressing of the steel belt avoided become. Thus a careful attachment of the end of the steel belt is ensured, without the usual costly exact fit between a thimble and a rigid wedge must become manufactured.

With a complementary form of the invention the two parts of the wedge are same formed and with the steel belt a careful .material on the peripheral surface coated. The two parts of the wedge and the end of the steel belt are covered by an hood from bind-careful material, eras ends after that impressions of the wedge into the thimble to the fuse of the bias of imprinting at the thimble are umgebördelt. The free end of the steel belt is secured by a positive tape stop with flanged hole screw. A tongue of the hood with a length of double width of the steel belt stands out from the thimble and has to the tongue point removing width and thickness and e.g. is with the steel belt. by sticking or soft soldering connected. Thus a transition of the rigidity at the restraint is in the thimble achieved to the free steel belt. Hereby the high safety of the volume attachment becomes, like that still increased as you by the preceding invention characteristic given is, in substantial single scores.

With an other addition of the invention their ends are to a spatial lever system connected, both the distribution of burdens and being enough that one above the other and that of the next to each other arranged steel belts simultaneous ensured and the excursions of the lever arms of the lever system in case of loss of a steel belt by stops limited with several secondary and one above the other arranged steel belts. Also this invention characteristic contributes to the safety of the volume attachment and thus the belt, by remaining according to plan division of the loads on the single belts automatic ensured.

With another embodiment of the invention the steel belts are in two groups divided, from which the first group in the normal operation carries the load and which second group takes over only in case of loss of a steel belt of the first group load. The steel belts of the second group preferably exhibit a smaller volume-thick and are provided with adhesive laminas, which give optical or mechanical or by magnetic points the pulses to the control of the Treibwerkes, whereby bend-free held by slots the central part of the lamina becomes when returning the steel belt. By this feature according to invention the Rrsatzbänder of the Treibwerkes becomes virgin held. Since they are in the ElanmaBigen operation unloaded, they are subject also to no length variations from the elongations due to the operational changes of the payloads and ensure thereby an absolute exact control by the glued on El & tchen. Known masses become magnetized spots brought by

Biegeechsel of the carrier disappearing; here the lamina becomes bend-free according to invention held as carriers of a magnetic point.

With a complementary form of the invention actual known testers are for current and automatic non destructive and preferably contactless examination in the run range of the steel belts arranged and the testers in the operating cycle automatic also in the regions of the steel belts displaced not contained in the pass and/or the steel belts will become by portable testers same type in the prescribed inspection intervals objectively checked to the objective Tberwachung of the regular state and to the fuse of the steel belts. Vcr zugsweise with several steel belts in a driver are strain gauges on the steel belts - excellent in their terminal portions - for the monitoring of the load distribution and eventual elimination of the Treibwerkes mounted. Also the line is one by a battery riding along of fed electric circuit arranged, those from eventual incipient cracks of the edge outline of the steel belts broke if required becomes and thus the Stillsetzung of the Treibwerkes automatic effected in the region of the entire all-round edge outline of the steel belts and in protected and opposite the steel belts electrically insulated arrangement and embodiment. By these objective methods for the monitoring and examination of the state of the steel belts particular for and by the steel belts is a degree of the monitoring of the steel belts and thus the Treibwerkes of unusual height of achieved in connection with the automatic security systems, which among other things in the height of the required coefficients for the allowable stress of the steel belts reducing will affect itself.

With an other embodiment the steel belts in the production are subject to the invention to special methods, provisions and regulations such as restricting the sword of the steel belts by an additional pass of the steel belts by a pressure roll rolling system, which forces upon a simultaneous plastic internal voltage condition to the steel belts over the whole length with compressive stresses within the edge ranges. pus e.g. grounds test and monitoring procedures. with eddy current testing sets with highly soluble probes for uncovering and eliminating also smallest defects in particular the edge ranges of the steel belts used. In addition a narrow region of higher elongation of the steel belts with smaller susceptibility for incipient cracks becomes provided by an increased temperature of tempering of the edge ranges. The provisions for the safety of the steel belts in the Treibwerken begin already according to invention with the production of the steel belts, particularly since the steel belts from their integral and simple Zuerschnittsaufbau offer most favorable premisses for simple and effective methods.

oh the invention the technicalsicherheitlichen Ir fordernissen the Treibwerke with steel belts in particular been sufficient for the steel belts by each other sicherheitlich associated eat-taken and incipient with the production, fastidious regarding a squeeze-free course, over constructional means up to dear being awake and emergency switching off systems comprising, so that the economic favourable possibilities full can be exhausted.

Those absolute thin and to to the boundary of the fabrication laid out by for instance o, steel belts 15 mm have on the one hand a practical unlimited alternating bending strength and to make possible thereby on the other hand very much small diameters of the rollers, which has the use of comparatively simpler and more economical drives to the sequence.

in addition because of the clear and simple calculable stress of the integral constructed steel belts - compared to Stablseilen - for the general permission substantial lower prescribed Sicherheitszahlen are to be expected.

The small thickness of the steel belts requires a corresponding large total width of the Bänder on the other side for a certain load; with several belts per Treibwerk their number should be as small as possible however from practical reasons, so that the single belts should get an absolute large width and/or. ground gotten. does not fit the bandwidth rises however those üfndlich keit the tape operation against deviations of the castors of the exact however practical to gewährleistenden being.

The crowning of the Umfläche of the adjusting rings, those the centring of the tape operation on the center of the bearing surface effected, is in as much very limited as with stronger crowning the direct-axis components of voltage - tension in volume center and compressive stresses in the edges of volume - and transverse voltages of very rapid very high and undue values would e.g. reach themselves. by current dents of the edge of volume - which so called kinks - make noticeable and which safety and the fatigue strength of the steel belts impair.

The squeeze-free course according to invention of the steel belts in connection with an only complementary slighter centring by a very small crowning of the Urfäche of the adjusting rings the reduced vorer hnten impairments safety of the steel belts.

The stress of the steel belts in the deflection on the rollers in SN LV and zuerrichtung is dependent of the ratio of the arrow f in the apex of the crowning to the radiuses of curvature in one gs and 'uerrichtung. Here however the radius in longitudinal direction should - i.e. the radius of the Ufläche in particular the propelled roller - from indispensable economic that and in transverse direction - the curving curvature - for centring reasons small of in each case its. It can be shown however that even for small absolute ores of f extraordinary large tension devoted and for broader steel belts besides the camber becomes weaker in the case of same f relative more flat and thus the action of the centring.

It is shown thus that the technical requirements and the virtschaftlichen advantages are linked moving in opposite directions however their contradictions throughout and during guarantee of the indispensable, safety of the steel belts after the invention dissolved.

In the Zeichnungen ehre remark examples of the invention are shown. Show: Fig 1 is a schematic side view of a plant to Promotion of loads.

Fig 2 shows a section by a roller.

Fig 3 shows a detail cut of a roller with sheet teeth.

Fig 4 an illustrated particularly low-friction approach disk.

Fig 5 shows the arrangement of several steel belts on one Roller.

Fig 6 illustrated in spatial illustration that Lever system.

Fig 7 points the attachment of the tape end and fig 8 is the side view to fig 7.

Fig 9 shows a spreading of the Steuerlättchen to the castor and fig 10 shows the tax panel in plan view.

Fig 11 represents the electric circuit and to fig 12 the arrangement of the powerline at the steel belt.

Fig 13 gives an opinion of the D of ngseigenspannungszustandes in the steel belt.

Fig 14 shows those separate heat treated edges of the Steel belt.

Fig 15 shows approach switches in the resting and in the switching state.

In Fig. 1 is as example a lift with reading photograph means II, the Treibwerk I, a propelled roller III and a loose roller III with larger diameter shown. The steel belts 10 lie on top of one another here and are to the lever systems VI connected. The planes of the tape operations 9 are by the respective band portions on both sides the rollers III fixed.

Fig. a loose roller III with basis role of 1, adjusting ring 2 and the steel belt 10 current on the bedding material 13 shows 2. The running surface becomes limited by the approach disks 15 and the flanges 14, between which the steel belt can adjust itself 10. The adjusting ring 2 can shift itself in predetermined and sufficient far inserted boundaries on the basis basis of 1 upon the run-planar 9 of the steel belt 10 to adjust, without exercising to the steel belt 10 obligation.

Fig. a propelled roller III with elbow teeth 16, which transfers the driving moment to the adjusting ring 2 and thus to the steel belt 10, shows 3.

Fig. a particularly easy current approach disk 17 represents 4, which is on the smaller diameter of the shaft 18 of the roller III roll-stored.

Fig. several Stahlbnder 10 shows 5 on a roller III, whereby only the two rimming steel volumes are 19 centered by spherical bearing surfaces.

Fig. the lever system VI shows 6 in spatial illustration with the roller III, that altogether four steel belts 10 with their terminal portions 45, the lever arms 38 and of them hn impacts 39.

Into the Fig. 7 and 8 is the attachment of the end 24 of the steel belt 10 in the thimble IV shown. There the wedge 25 existing from the two equal parts 26 is covered of the end 24 and the hood 30 and all parts becomes with bias into the thimble IV pressed and by flaring the ends 31, 36 of the hood 30 fixed. A special fuse still experiences the steel belt 10 by the tongue 35, the one transition of the rigidities within the restraint range of the steel belt 10 ensured, which will affect the fatigue strength of the volume attachment favorable.

The Fig. 9 and 10 shows a lamina 40 fixed on the steel belt 10, which by a particular type of the attachment and the slots 42 for - the central part 43 as carriers of the control information of the Treibwerkes I when returning the steel belt 10 held becomes bend-free.

Into the Fig. 11 and 12 is in protected and isolated arrangement 47 the power 48 of an electric circuit 50 in the edge outline 46 of the steel belt 10 shown, operated by the battery 4.

Fig. 13 represents the internal voltage condition 51 with the tips of the compressive stresses, achieved by a special conclusion rolling of the steel belt 10, 52 within the edge ranges 46.

Fig. 14 shows the narrow regions 53 of higher elongation of the steel belt 70, which by a higher temperature of tempering limited in transverse direction over the length of the steel belt 10 provided are.

Fig. 15 shows the approach switch V with the switching arms 22 - on the right side of the fig in resilient out-more directed, D. h. through go wrong the steel belt 10 connected position -, the Eontaktarmen 20 and the switch contacts 23.

Patentanprüfe 1. Roller for more otahlbänder in Treibwerken for plants, e.g.

Plants to the promotion of loads, characterised in that the roller (III) of a basis role (1) with concave Umfläche (3) and the basis role (1) a comprising adjusting ring (2) with convex inner surface (4), its diameter consists in the center plane (5) of the roller (III) around the diameter difference (6) is larger as the diameters of the basis role (1) in the same LITTLELEBENE (5) the roller (III), and furthermore the Halbmesser (7) the concave Umfläche (3) of the basis role (1) is larger than the Halbmesser (8) of the convex inner surface (4) the adjusting ring (2), in case of one ichtübereinstimmung the run-planar (9) of the steel belt (10) and that the basis role (1) the adjusting ring (2) into the run-planar (9) of the steel belt (10) move and thus the squeeze-free course of the steel belt (10) ensured so there remain.

2. Roller according to claim 1, characterised in that the basis role (1) to the receptacle of the adjusting ring (2) transverse to its axis (11) is divisible and the adjusting ring (2) with a convex Umfläche (12) is provided, those with bind-careful bedding material (13) high

and constant friction values coated e.g. is and the Umfläche (3) of the basis role (i) and the inner surface (4) of the adjusting ring (2) against rolling wear. by surface-hardening in actual known manner protected and the basis role (1) and/or the adjusting ring (2) with flanges (14) and/or approach disks (15) are provided.

3. castor after the claims 1 and 2, characterised in that in: Palle the castor (III) driven becomes the Umfläche (3) of the basis role (1) and the inner surface (4) of the adjusting ring (2) with an elbow teeth (16) with tape skew play and with arrangement of several steel belts (10) these are provided either on an adjusting ring (2) with several running surfaces or on separate adjusting rings (2) and/or rollers (III) diverted will have and the running surfaces a larger width than the steel belts (10) and before the flanges (14) memo current Anlaufsoeben (17) with bind-carefully coated, resilient back-yielding and inclined/slanted approach-flat arranged preferably draws and with small diameter on the shafts (18) of the rollers (III) stored is.

4. Roller after the claims 1 to 3, characterised in that the Umflächen (12) of the adjusting rings (2) only slight spherically convex formed and the crowning arcuate or curvatures stronger in the edge regions exhibits than in the central portion and with several steel belts (10) on the Umfläche (12) for each steel belt (10) a spherical region of the running surface provided is or only the two rimming steel volumes (19) spherical Umflächen (12) associated is.

5. Preferably roller after the claims 1 to 4, characterised in that on the flanges (14) of the rollers (III) and the flanges (14) of the adjusting rings (2) at the periphery or several Anlaufsohalter (V) an arranged are, those in the regular operative condition with their contact arm (20) in actual known manner resilient on the front surfaces (21) of the flanges (14) pressed e.g. are and with the start of the steel belt (10) to the switching arm (22) between contact arm (20) and or several in actual known manner. cause an optical and/or acoustic display and/or the putting out of operation of the Treibwerkes (I) by rollers in small and constant distance of the flange (14) switch contacts held (23) at the periphery of the flanges (14) immediately or after completion of the operating period.

6. Finite steel belt in Treibwerken with rollers according to claim 1, characterized thereby, daL' the end (24) of the belt (10) in actual known manner in a thimble (IV) fixed is, the wedge (25) of the thimble (IV) prolonged-divided is, between which a gap (27) remains to parts (26) of the wedge (25) US the parts (26) of the wedge (25) around a placing ball (28) between the two parts (26) of the wedge (are 25) to each other more pivotable, so that itself the two parts (26) of the wedge (25) when putting in around the two-piece wedge (25) of put end (24) of the steel belt (10) into the thimble (IV) squeeze-free over the end (24) of the steel belt (10) to the supporting surfaces (29) of the thimble (1y) to put on and edge pressing of the steel belt (10) avoided becomes.

7. Steel belt according to claim 6, characterised in that the two parts (26) of the wedge (25) same formed are, with the steel belt (10) a careful material on the peripheral surface coated are and the two parts (26) of the wedge (25) and the end (24) of the steel belt (10) by an hood (30) from bind-careful material, their ends (31,36) are covered after that

impressions of the wedge (25) into the thimble (IV) to the fuse of the bias of imprinting at the thimble (IV) are umgebördelt and the free end (32) of the steel belt (1o) by one e.g. form conclusive tape stop (33) with flanged hole screw (34) secured is and a tongue (35) of the hood (30) with a prolonged one of double width of the steel belt (1o) from the thimble (IV) stands out and the tongue (35) to the tongue point (37) removing width and thickness exhibits, with the steel belt (1o). by Iffeben or soft soldering connected and thus a transition of the rigidity at the restraint in the thimble (IV) to the free steel belt (1o) achieved is.

8. Steel belt after the claims 6 and 7, characterised in that with several secondary and one above the other arranged steel belts (10) their ends (24) at a spatial HebeBNstem (VI) connected are, which is both the distribution of burdens and lengthening that one above the other and that of the next to each other arranged steel belts (10) simultaneous ensured and the excursions of the lever arms (38) of the lever system (VI) in case of loss of a steel belt (10) by stops (39) limited.

9. Steel belt after the claims 6 to 8, characterised in that the steel belts (1o) in two groups divided are, from which the first group in the normal operation the load (II) carry and which second group takes over only in case of loss of a steel belt (1o) of the first group load (II) and which steel belts (1o) of the second group preferably exhibit a smaller volume-thick and are provided with adhesive lamina (40), which gives optical or mechanical or by magnetic points (41) the pulses to the control of the Treibwerkes (I), whereby by slots (42) the central part (43) of the lamina (40) when returning the steel belt (10) bend-free held becomes.

10. Steel belt after the claims 6 to 9, daß known testers (44), actual characterized thus, to the objective monitoring of the regular state and the fuse of the steel belts (1o), for current and automatic non destructive and preferably contactless examination within the run range of the steel belts (1o) arranged and the testers (44) in the operating cycle automatic are also into the regions of the steel belts (1o), not contained in the pass, displaced and/or the steel belts (1o) by portable testers same type in the prescribed inspection intervals of objectively checked will become and/or preferably with several steel belts (1o) in a Treibwerk (I) strain gauge on the steel belts (1o) - excellent in their terminal portions (45) - for the monitoring of the load distribution and eventual elimination of the Treibwerkes (I) mounted are and/or in the region of the entire all-round edge outline (46) of the steel belts (1o) and in protected and opposite the steel belts (1o) electrically insulated arrangement (47) and embodiment the line (48) if required one by a battery riding along (49) of fed electric circuit (50) arranged is, those from eventual incipient cracks of the edge outline (46) of the steel belts (1o) durohrissen becomes and thus the Stillsetzung of the Treibwerkes (I) automatic effected.

11. Steel belt after the claims 6 to 1o, characterised in that the steel belts (1o) in the production special methods, provisions and regulations are subject like restricting the sword of the steel belts (1o) by an additional pass of the steel belts (1o) by a pressure roll rolling system, that to the steel belts (1o) simultaneous einenplastizierten internal voltage condition (51) over the entire prolonged with compressive stresses (52) within the edge

ranges (46) over be awake-muddled e.g. force upon and test and. with eddy current testing sets with highly soluble probes for uncovering and eliminating also smallest Fehistellen in particular the edge ranges (46) of the steel belts (10) and a region (53) of higher elongation of the edge ranges (46) of the steel belts (10) e.g. by an increased temperature of tempering of the edge ranges (46), which a smaller susceptibility for incipient cracks of the edge ranges (46) of the steel belts (10) has to the sequence.